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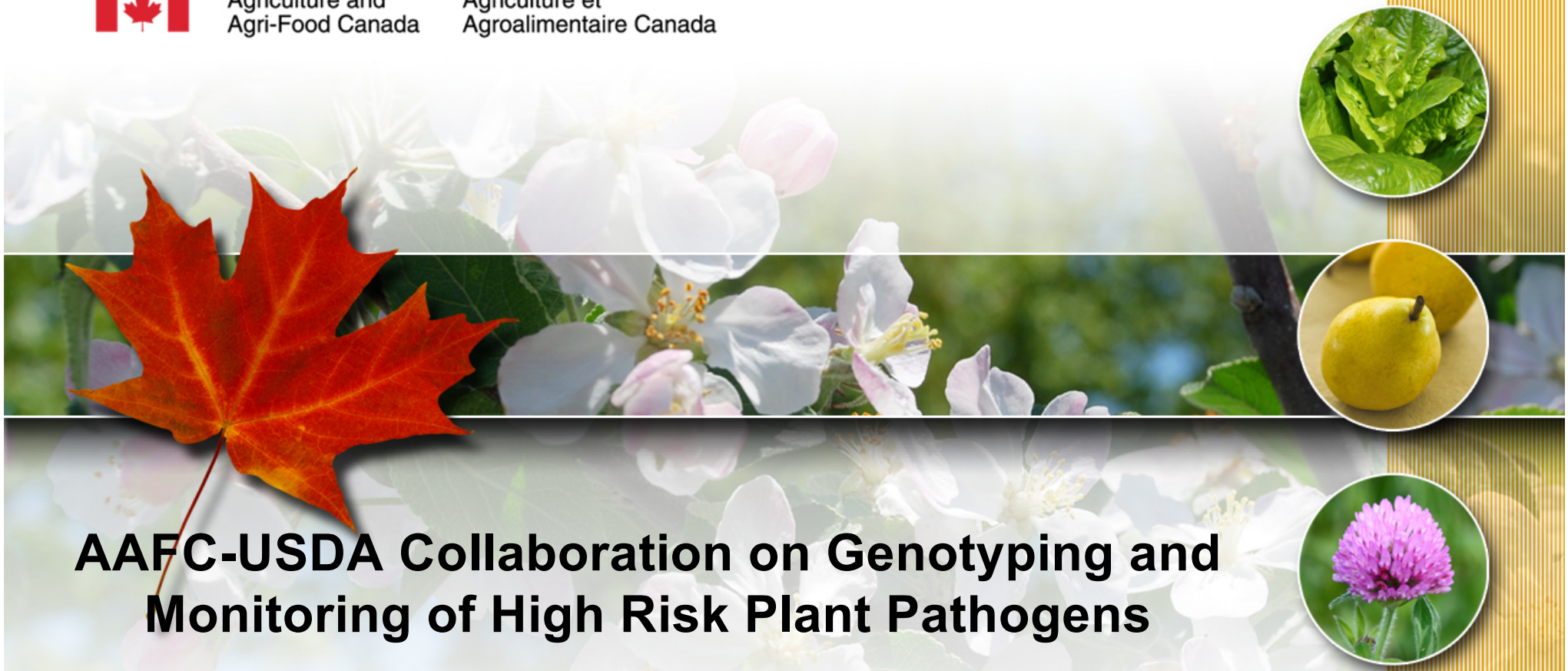


AAFC-USDA Collaboration on Genotyping and Monitoring of High Risk Plant Pathogens

Cleveland, OH, USA
August 3, 2019

Dr. Oualid (Walid) Ellouz
Plant Pathologist

Canada

Areas of Expertise

Crops:

Pome, nut and tender fruit trees
Grapes
Field and greenhouse vegetables
Wheat
Pulses

Areas of Expertise

Current Projects:

Emerging fruit tree decline (AAFC Funded project, External collaborator: Dr. Ruhui Li, USDA Beltsville, MD).

IPM of phytophythora diseases of vegetable crops.

Analyzing the microbiome of mature apple in different geographical regions of the world (Dr. Michael Wisniewski, USDA Kearneysville, WV).

Previous Projects:

Effects of host genotype on root and soil microbiome of field crops.

Cucumber Green Mottle Mosaic Virus (CGMMV) and its management in Alberta greenhouses (Dr. Kai-shu Ling, USDA Charleston, SC).

Emerging Fruit Tree Decline Disease

Sudden Apple Decline (SAD)
Severe Apple mortality (Up to 40%)
Newly planted trees die off within two weeks

Fruit Tree Decline (FTD)
Severe stone fruit trees mortality (Up to 60%).
Newly planted trees die off within 2 years

Rates of mortality in stone fruit

	Fruit	Krymsk 1	Krymsk 86
Farm 1	Nectarines	0%	0%
Farm 2	Plums	12.0%	12.0%
Farm 3	Plums	23.3%	23.3%
Farm 4	Apricots	46.7%	50.0%
Farm 5	Plums	20.0%	0.0%
Farm 5	Plums	0%	0%
Farm 5	Apricots	60.0%	50.0%
Farm 6	Apricots	24.5%	16.0%

Kathryn Carter, OMAFRA

Potential Causal agent(s)

Fungal/bacterial pathogens

Viral pathogens

Plant-parasitic nematodes

Insects

Abiotic stresses

Or

Combined stresses

Objective

Identify the cause of SAD and FTD diseases

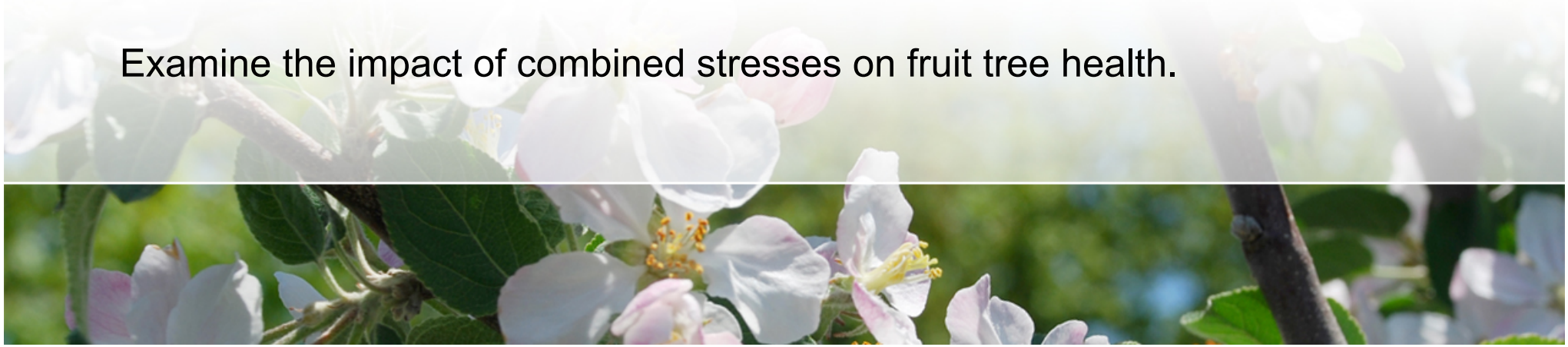
Research Approach

Sampling sites across Canada (BC, ON, QC, NS and PEI)

Identify and characterize pathogens associated with diseased trees in Canadian orchards

Determine the involvement of known and new organisms in etiology of the emerging fruit tree decline disease.

Examine the impact of combined stresses on fruit tree health.



Standard diagnostic tests

Isolation, identification and Koch's postulates

Next Generation Sequencing-based methods

High throughput sequencing approach:

Permit the investigation of complex microbiomes

Identifies culturable and unculturable organisms.

More time-consuming and expensive than standard diagnostic tests.

Once sequence of organisms are characterized by high-throughput sequencing, standard diagnostic tests can be developed for surveys.

IPM of phytophythora diseases of vegetable crops

Causal agent

Phytophthora capsici (oomycete)

Crops

Affects >50 species in 15 plant families
The most important disease of peppers and cucurbits

Diseases

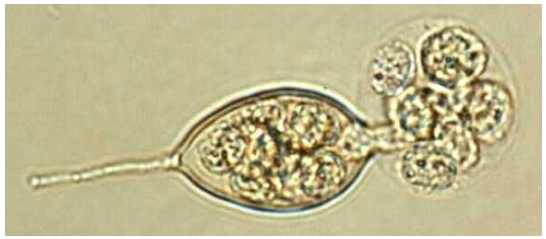
Damping-off
Root and crown rot
Leaves, fruit, and stem blight

Importance

Worldwide occurrence

Causes up to 100% crop losses

P. capsici oospores can survive in the soil for many years



Objective

To develop IPM practices that incorporate biopesticides, to control phytophthora diseases of vegetable crops.

Research Approach

Field trials to evaluate different combinations of cultural practices:

Biofungicide applications

Bed type (flat or raised)

Frequency of irrigation

Next Generation Sequencing-based methods

Interpreting the Pathogenicity of Genetic Variants of *P. capsici* strains.

Analyze the microbiome of phytophthora disease-suppressive and conducive soils.

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Thank you!

For more information, please contact:

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Canada